FATTY ACID PROFILE OF WILD GREATER AMBERJACK FEMALE GONADS FROM MEDITERRANEAN AND ATLANTIC AREAS

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Introduction

The lack of reliable reproduction is one of the main bottlenecks for the incorporation of greater amberjack (*Seriola dumerili*) in the EU aquaculture industry. In the frame of the FP7-funded DIVERSIFY, to assess the reproductive potential of wild vs. captive amberjack broodstocks and identify possible reproductive/metabolic dysfunctions during gametogenesis are important goals. In this sense, characterization of wild broodstock nutritional status is crucial.

Greater amberjack, like all other marine carnivorous fish studied so far, requires eicosapentaenoic acid (20:5n-3, EPA), docosahexaenoic acid (22:6n-3, DHA) and arachidonic acid (20:4n-6, AA) for reproduction success. Female gonad proportions of phosphatidylcholine (PC) and phosphatidylethanolamine (PE) and their fatty acid (FA) composition are critical factors to allow proper reproductive function and embryonic development. The importance of n-3 HUFA and particularly DHA content on gonadal development and egg quality (fecundity, hatching and larvae survival rates) has been highlighted by several authors. In addition, AA eicosanoids derivatives have a wide range of functions in fish reproduction, including pheromonal attraction, steroidogenesis, or ovulation and oocyte maturation. Since EPA and AA compete for the same enzymatic complex to generate different series of prostanoids, the relative proportions of these fatty acids in broodsctock gonads seem to be more important than the level of each fatty acid so that imbalances in the EPA/AA ratio could lead to deregulated production of different mediators involved in reproduction.

Fatty acid composition of fish tissues is mainly influenced by dietary fatty acid profile and environmental factors including temperature. Therefore, considering that Mediterranean and Atlantic broodstocks will be studied within the context of DIVERSIFY, the aim of this study was to compare the total lipid (TL) content and FA profiles from ovaries of wild Atlantic and Mediterranean mature females of greater amberjack.

Material and Methods

The TL content and ovary fatty acid composition of TL extract and PC, PE and triacylglyceride (TG) fractions from 5 wild Atlantic mature females (wt 14.4±5kg; GSI 3.5±0.8) and 6 wild Mediterranean mature females (wt 12.1±1kg; GSI 4.5±1.2) were statistically compared.

Results

No significant differences were found in terms of ovary TL between fish from both geographical areas (16.6±1.1 and 17.8±0.8, respectively). Mediterranean fish displayed a higher level of saturated fatty acids, C16:1, EPA and AA whereas Atlantic females were richer in 18:1n-9. Results from the principal component analysis (PCA) (Figure 1) show that Mediterranean and Atlantic populations can be clearly distinguished based on the ovary whole fatty acid profiles of TL, and PC,PE and TG fractions. Despite the above mentioned differences in the levels of EPA and AA, non geographical differences were found in terms of ovaries EPA/AA ratios and DHA total contents.

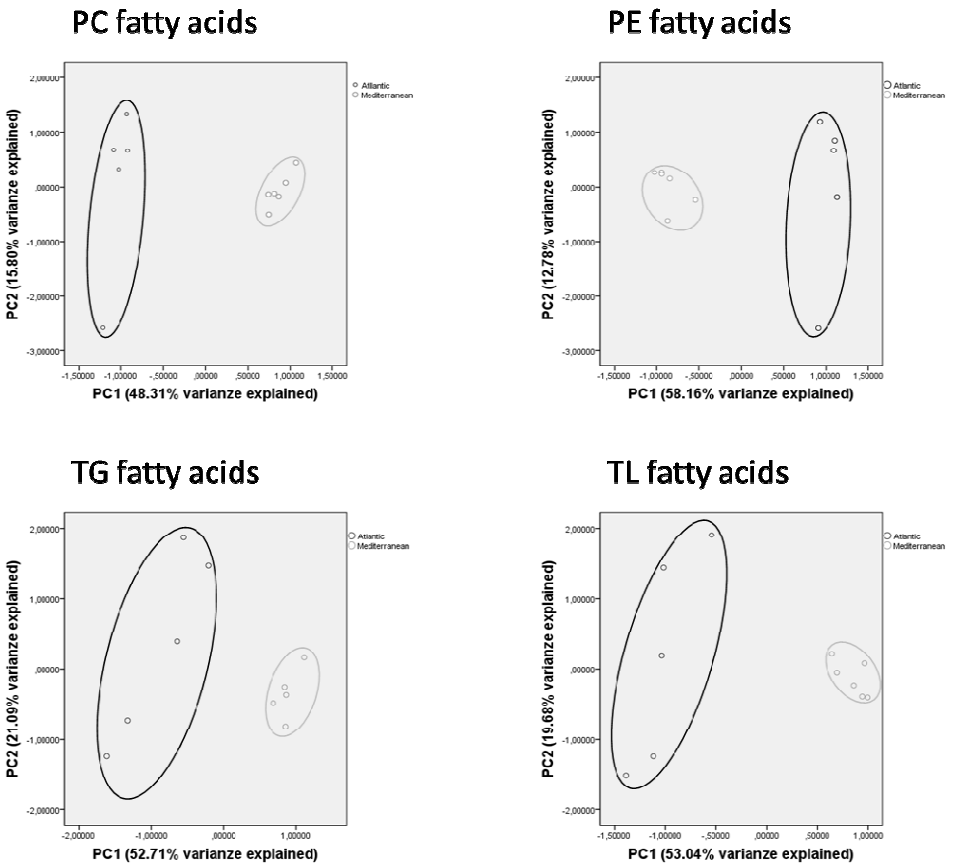

Fig.1.PCA of fatty acid profiles of TL, and PC, PE and TG fractions of ovaries from Atlantic and Mediterranean wild females. Factor score plot (graphical representation of individual scores for each Principal Component). Ellipses represent different clusters for PC1 according to T-student results; [(○) Atlantic females; (○) Mediterranean females].

Discussion and conclusions

It is worthy to notice that the ovary whole FA profile of the different females analyzed can be useful to identify their geographical origin, accordingly to traceability of fatty acids previously reported for other vertebrates. In spite of this, the lack of differences in the EPA/ARA ratio and DHA contents, confirms the importance of maintaining this two lipidic features unaltered to ensure reproductive success (Lister et al. 2008; Rodriguez-Barreto et al. 2014).

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